

Best Practices for Beehive and Pollinator Projects



Presented by

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NC State Beekeepers Association
4500 Members, Org. Jan 11, 1917

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NC State University





The History and Impact of Prior Honey Bee Legislation

The Role of the NCSBA in Beekeeping



The Honey Bee, A Noble Creature

Size = Less than an inch

Weighs less than a
dime

Pollinates $\frac{1}{3}$ of our
food

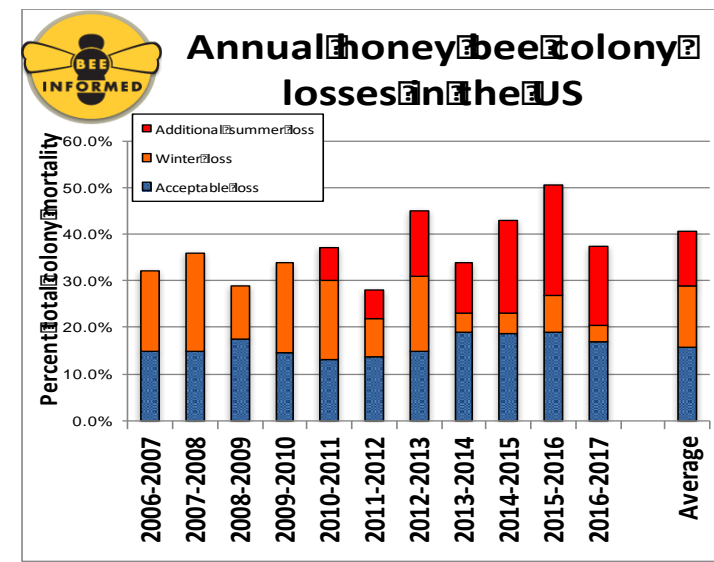
Agricultural Workhorse





Annual losses have averaged 33%- 45%
For the past decade

Losses greater than 50%
this most recent winter
....and we are still
counting.





The Honey Bee Garden at NC Zoo NCSBA Raised \$280,000



Dedicated 2009



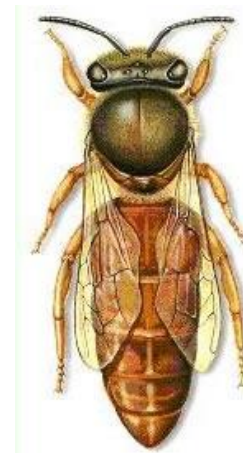


Best Practices Involve Honey Bee Stock Improvement

**Issues with the current sources of honey bees for NC
Importance of an in-state supply of honey bees and
queens**

**Queen rearing is the means for potential
improvement**

The Born and Bred Queen Rearing Program





Born and Bred

A queen rearing program to help improve the local honey bee stocks and increase the in-state supply





NCSBA priorities to bolster NCSU Apiculture Program

- **Secure the Apiculture Technician (“chief beekeeper”) position with secure funding**
- **Augmentation of extension apiculture with a full-time extension associate**





The Importance of Honey Bee Research

The Role of the Honey Bee as a Pollinator
NCSBA's Apiculture Science Initiative





Architectural rendering of the proposed NCSU Lab





The Current NCSU Field Research Lab





Honey Bee Queen & Disease Clinic

Better Data, Better Bees

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Quality Assurance

Morphometric Analyses: multiple measures of queen or drone, body and reproductive tract (rearing quality)

Semen Quality: total sperm count, and sperm viability in queens (mating success), or drones (mating potential)

Genotyping Analyses: full assessment of paternity for up to 48 workers and an estimate of queen mating frequency

Quality Report: a "grade" report of a queen or drone's reproductive quality for your quick interpretation



Troubleshooting

Pathogen Screening: identification of presence and relative levels of ABPV, BQCV, DWV(A&B), IAPV, LSV, Trypanosomes, and both *Nosema* species

Mitotyping for Africanization: genetic analyses of maternal ancestry as African or European using population genetic techniques and markers

Your Bees, Your Data: any results or interpretations from our work is held in the strictest confidentiality and anonymity



Customized Experimentation

This highly-tailored collaboration involves custom experimental design, analyses, and interpretation. This unique partnership between science and industry has been utilized to:

- Test the impact of various agrochemicals
- Assess the effects of banking on queen quality measures
- Evaluate novel management practices' improvements in queen mating quality
- Observe the effects of shipping on queen health and sperm quality

Contact us for more information & pricing

Queen & Disease Clinic Pricing (five sample minimum, bulk pricing available)

Analysis	Pricing (per sample)	Samples Tested		
		Queens	Drones	Colonies
Reproductive Quality	\$24.00	✓	✓	✓
Standard Pathogen Screen	\$55.00	✓	✓	✓
Apiary Pathogen Screen	\$220.00*	*up to 10 colonies, pooled		
Mitotyping (Africanization)	\$35.00	✓	✓	✓
Genotyping (Mating Number)	\$320.00			✓

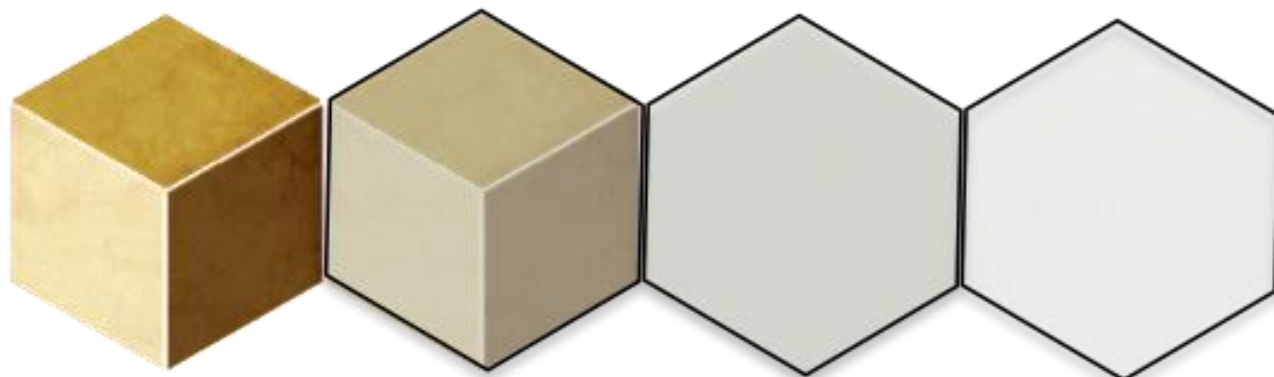
Strong Research Foundations

Established as a natural extension service providing basic and field honey bee research at NCSU, the clinic has worked to improve colony health for over 10 years.

Custom Disease Screening

Additional and custom pathogen targets available upon request

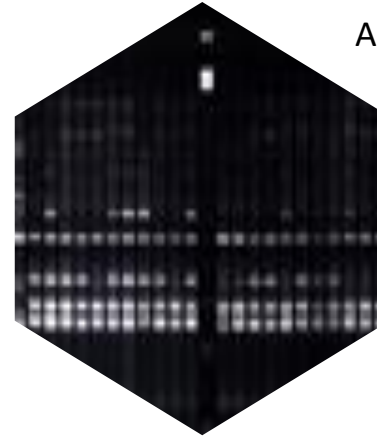
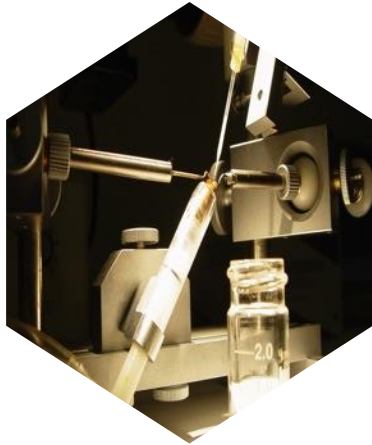
Beekeeper Education & Engagement System



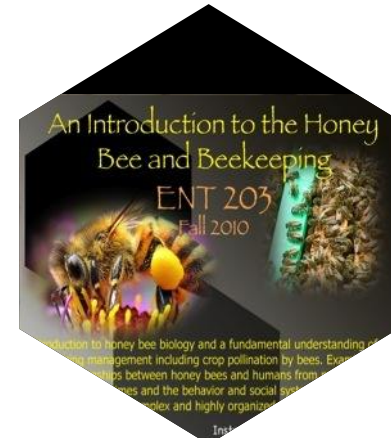
	EDUCATION	ENGAGEMENT	INVOLVEMENT
Ambassador (no courses)	<p>Bee school Enroll new BEES participants</p> <p>AND</p> <p>Field day Mentor beekeepers in the apiary</p> <p>OR</p> <p>Workshop Hands-on demo</p>	<p>Article Write a popular article</p> <p>AND</p> <p>News story Get interviewed</p> <p>OR</p> <p>Public seminar Promote bees and beekeeping</p>	<p>Conference seminar Promote BEES</p> <p>AND</p> <p>Research Test your own hypothesis</p> <p>OR</p> <p>Lecture Make a new post on BEES</p>
Advanced (21 courses)	<p>1. Other stinging insects</p> <p>2. Honey bee anatomy</p> <p>3. Pheromones</p> <p>4. Bee botany</p> <p>5. Queens and mating</p> <p>6. Genetics of bees</p> <p>7. Foraging biology</p> <p>8. Honey bees of the world</p>	<p>1. Tools of the trade</p> <p>2. Advanced management techniques</p> <p>3. Parasites, pathogens, pests, and problems</p> <p>4. Varroa mite IPM</p> <p>5. Queen rearing and bee breeding</p> <p>6. Honey bee stocks</p>	<p>1. Africanized bees</p> <p>2. Colony collapse disorder</p> <p>3. Pesticides</p> <p>4. Honey labeling</p> <p>5. Crop pollination</p> <p>6. Honey and hive products</p> <p>7. History of beekeeping</p>
Beginner (3 courses)	<p>Basic honey bee biology and life history</p>	<p>Intro to beekeeping and hive management</p>	<p>Importance of bees and beekeeping to society</p>

Each Mini-course \$25/person

*All prices and offering subject to change without notice



Research



Extension

Instru



Economic Impact of Honey Bee Pollination

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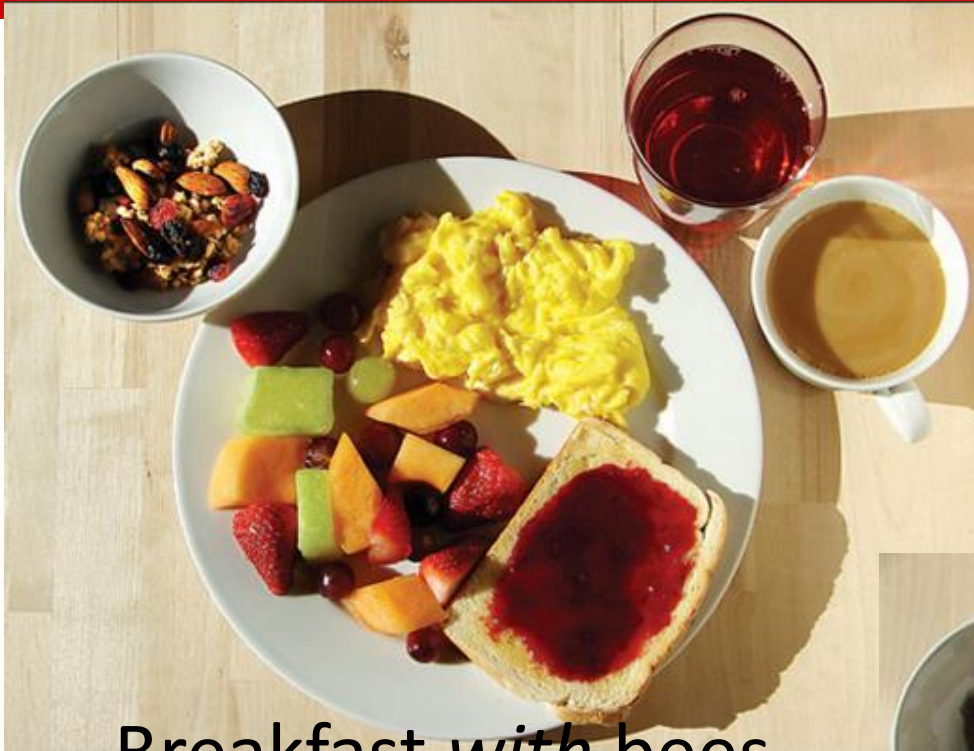
Bee-dependent crops account for \$47.1 billion every year, of which **\$14.6 billion is attributable to honey bee pollination**

Honey bees are responsible for **one-third of everything that people eat** every day



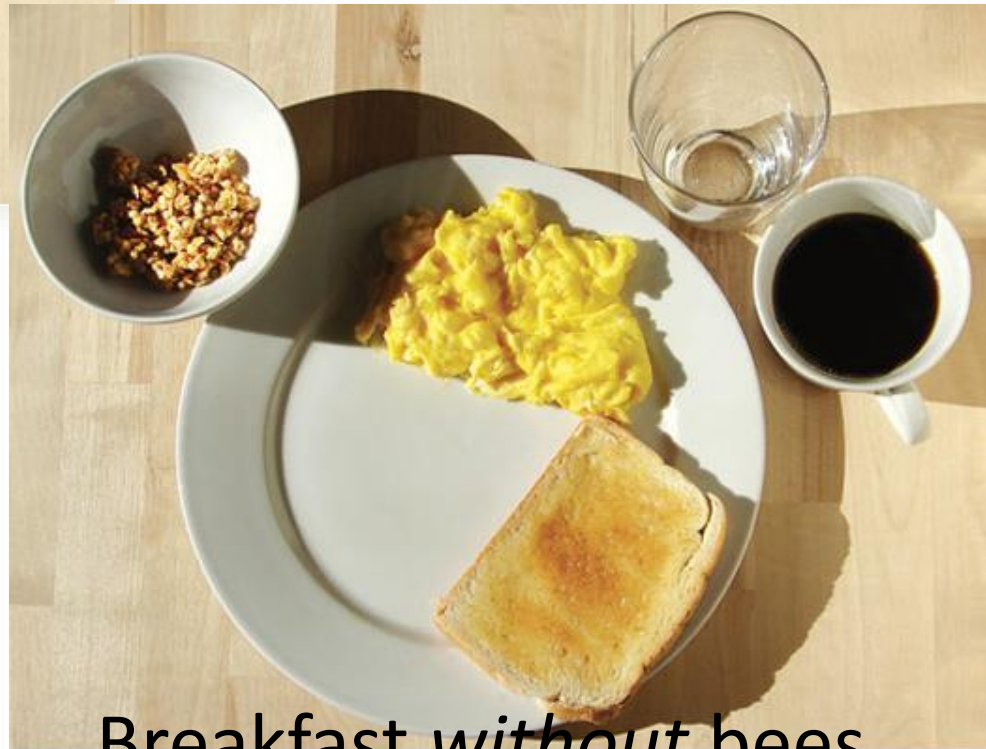
From Morse & Calderone (2000) *Bee Culture*





Breakfast *with* bees

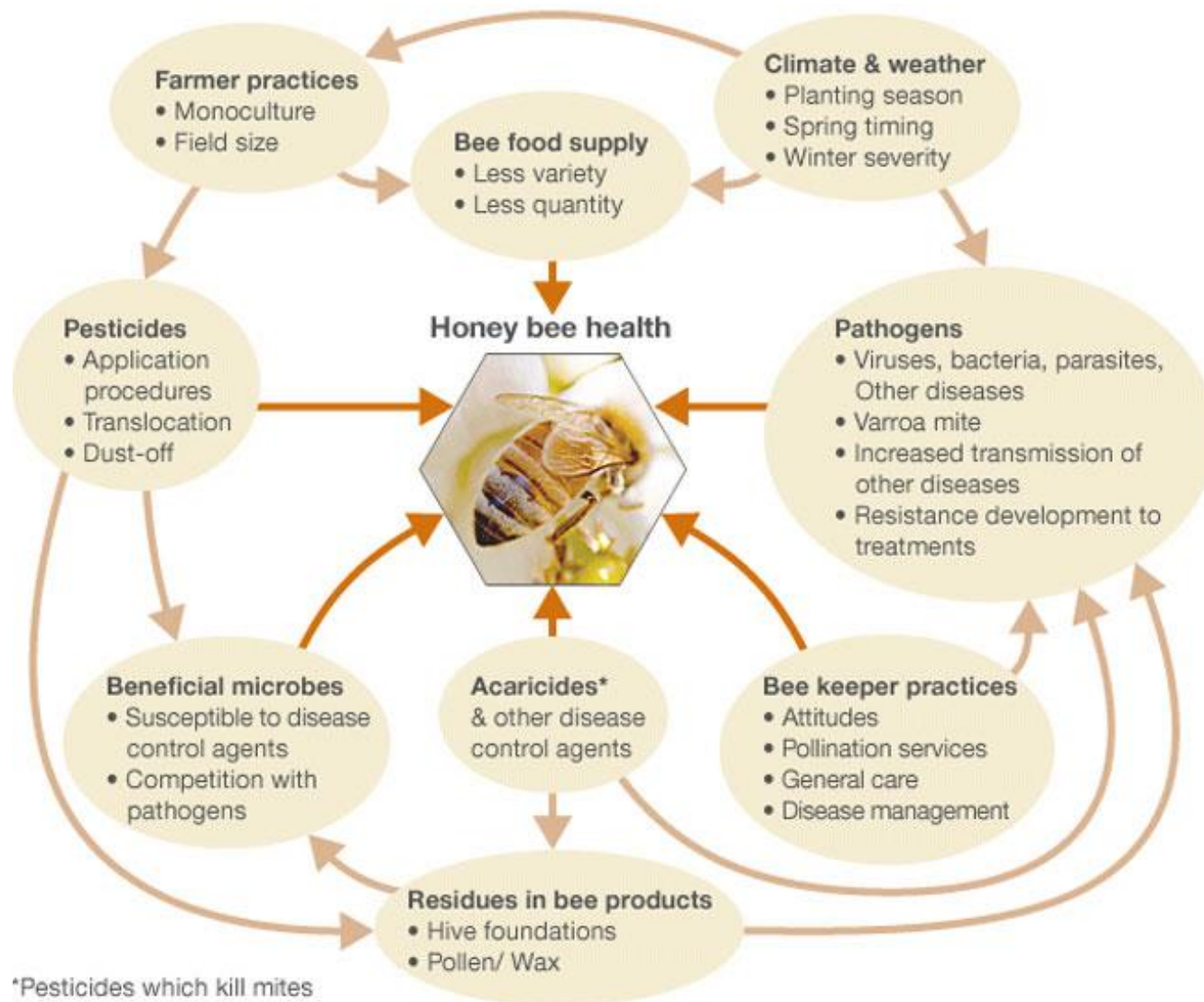
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Breakfast *without* bees



STRESS FACTORS ON HONEY BEE HEALTH



Source: OPERA Bee health in Europe, 2013



“Low-priority” problems

- ✓ Cell Phones
- ✓ Rapture
- ✓ Terrorist
- ✓ Soviet plot





Polyandry and genetic diversity



Molecular and pollination ecology



Oxidative stress and social immunity

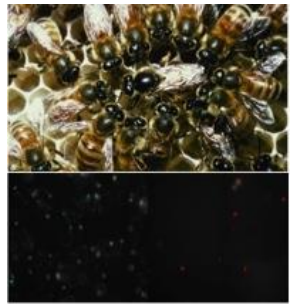


Parasite and pathogen IPM



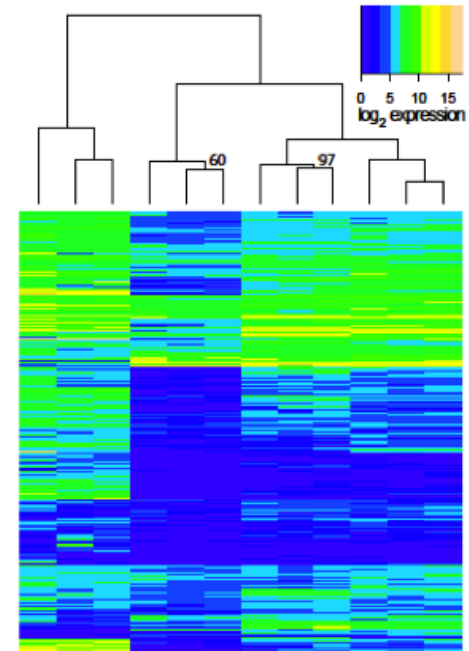
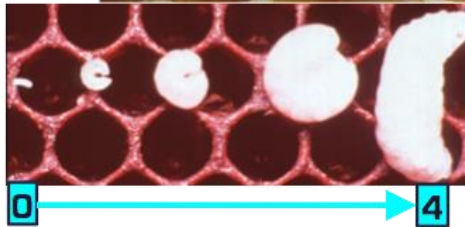
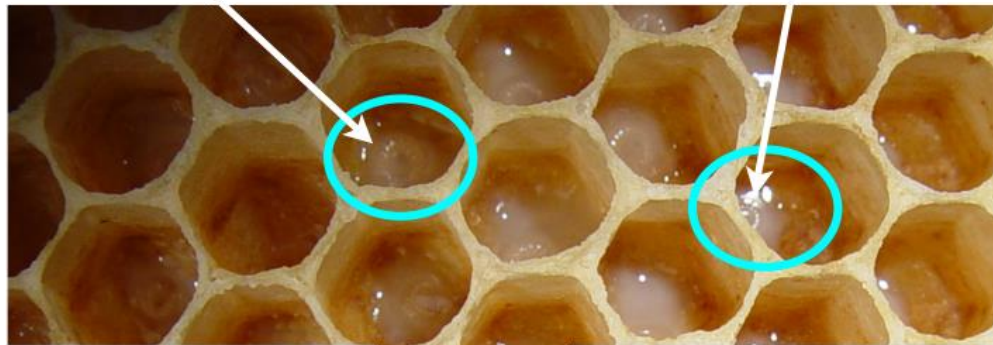
Queen reproductive quality

Queen reproductive quality



2-day-old larva = "low quality" queen

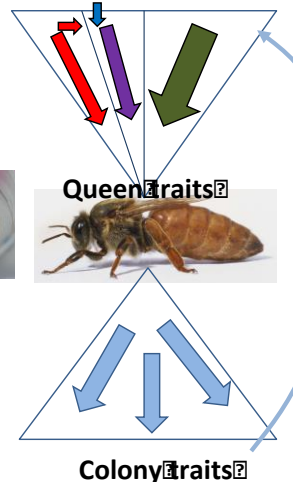
0-day-old larva = "high quality" queen



Factors that affect queen traits

Genes
innate social

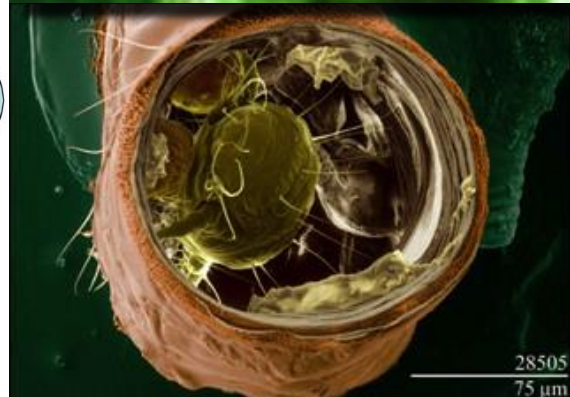
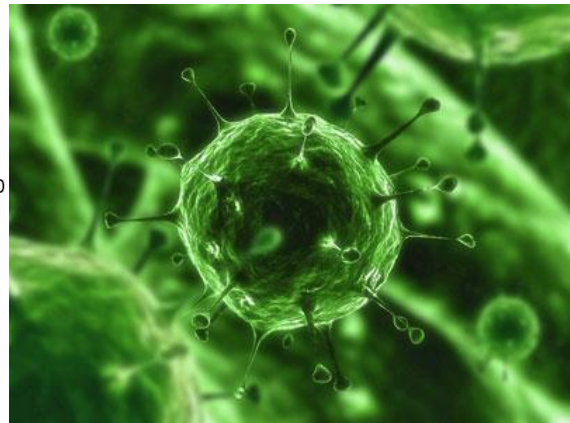
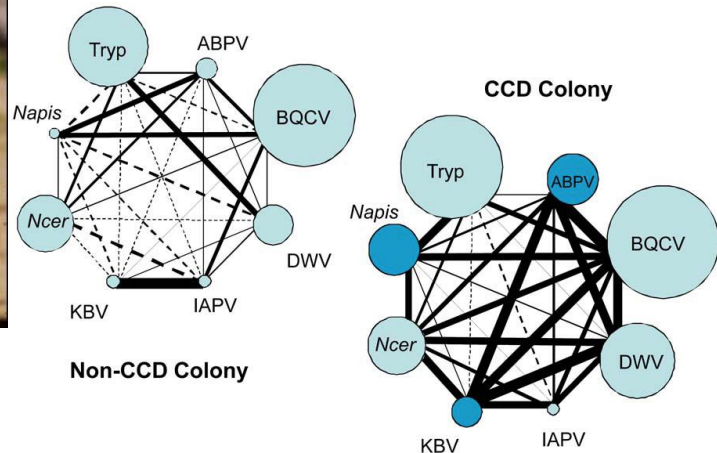
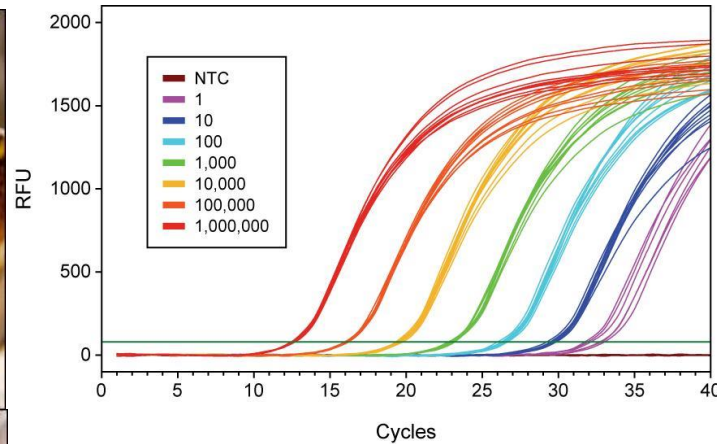
Environment



Tarpy et al. (2012). *J. Econ. Ent*; Delaney et al. (2011). *Apidologie*; Rangel et al. (2012). *Ins. Soc*; Tarpy et al. (2011). *Ins. Soc*

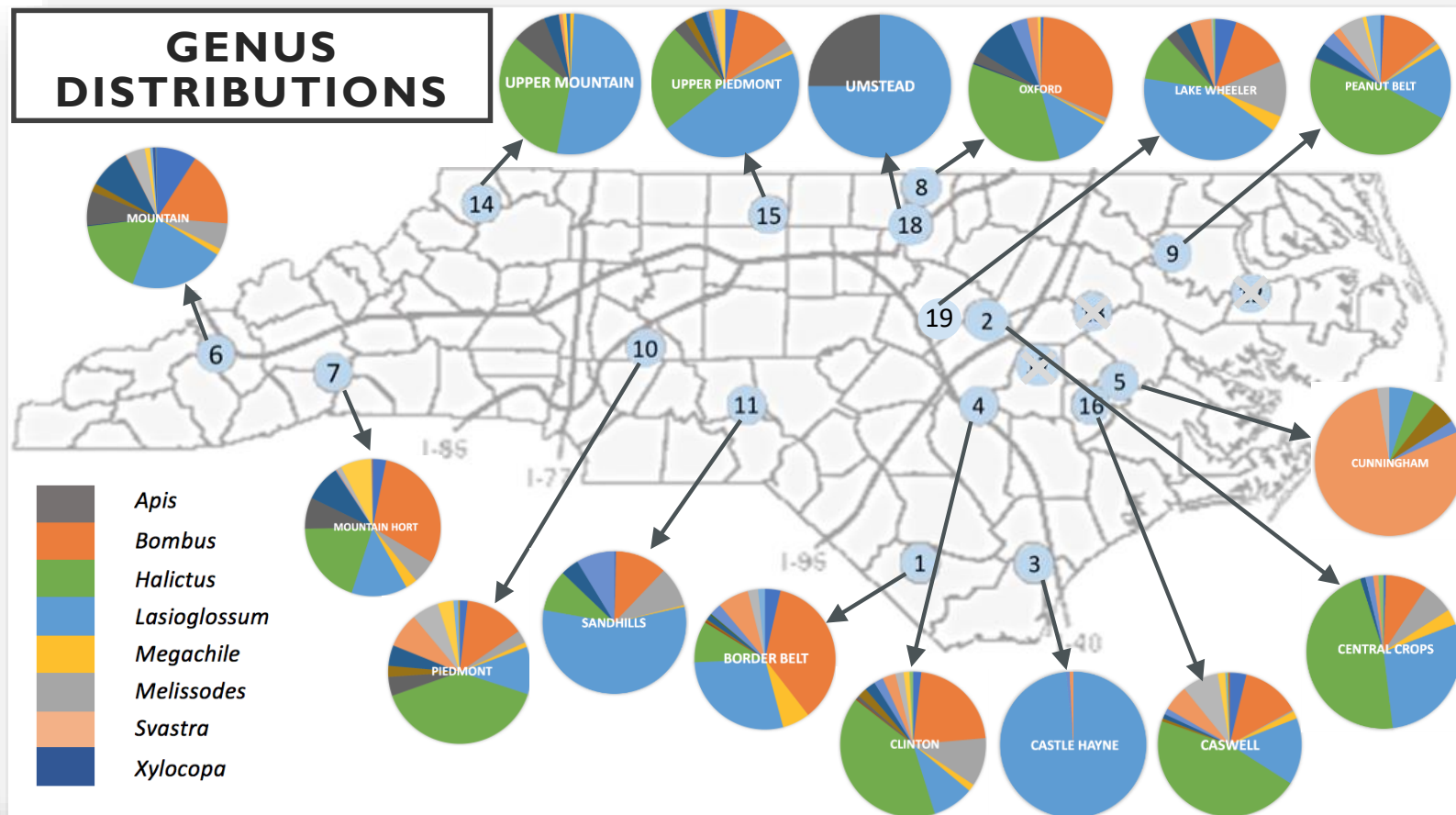
Parasite and pathogen IPM

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Cornman et al. (2012). *PLoS ONE*; Wantuch & Tarpy. (2009). *J. Econ. Entomol.*;
vanEngelsdorp et al. (2013). *Prev. Vet. Med*

Pollinator communities across NC





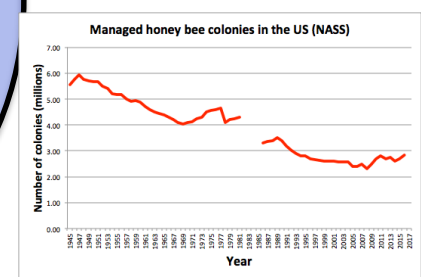
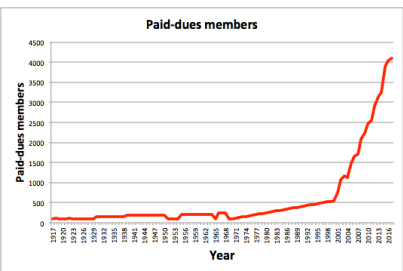
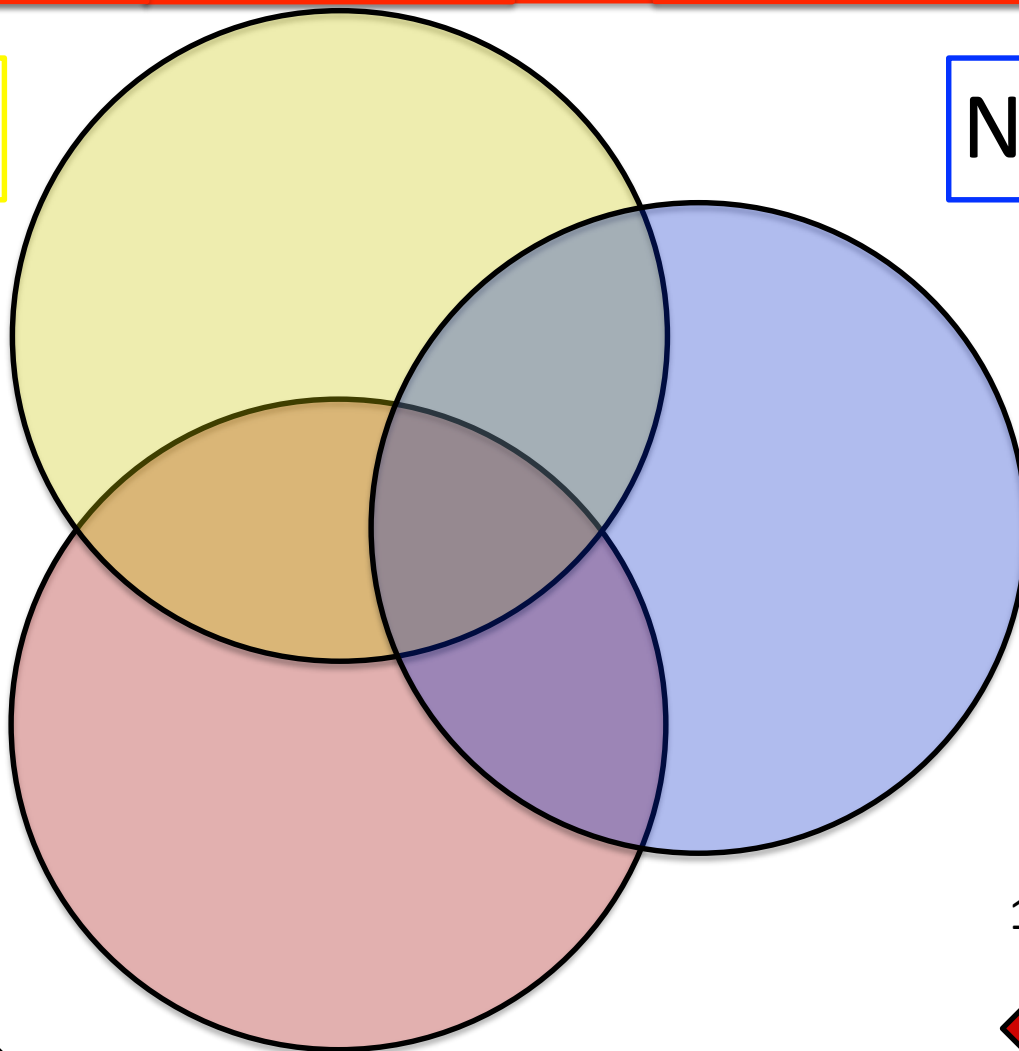


NCSBA

NCDA&CS

INDUSTRY

REGULATORY



RESEARCH/TEACHING

85%

EXTENSION

15%

NCSU Apiculture

